rocks sometime, and indeed before my end, will allow a thorough passage."

Farkas on December 27, 1808, writes to Gauss: "Oft thought I, gladly would I, as Jacob for Rachel serve, in order to know the parallels founded even if by another." "Now just as I thought it out on Christmas night, while the Catholics were celebrating the birth of the Saviour in the neighboring church, yesterday wrote it down, I send it to you enclosed herewith." "Tomorrow must I journey out to my land, have no time to revise; neglect I it now, may be a year is lost, or indeed find I the fault, and send it not, as has already happened with hundreds, which I as I found them took for genuine. Yet it did not come to writing those down, probably because they were too long, too difficult, too artificial; but the present I wrote off at once. As soon as you can, write me your real judgment."

This letter Gauss never answered, and never wrote again until 1832, a quarter of a century later, when the non-Euclidean geometry had been published by both Lobachevski and Bolyai János.

This settles now forever all question of Gauss having been of the slightest or remotest help or aid to young János, who in 1823 announced to his father Farkas in a letter still extant, which I saw in Maros-Vásárhely, his creation of the non-Euclidean geometry as something undreamed of in the world before.

This immortal letter, a charming and glorious outpouring of pure young genius, I gave in the Introduction to my *Bolyai*, 1896. It was reproduced in fac simile as frontispiece to the Bolyai Memorial Volume in 1902.

The equally complete freedom of Lobachevski from the slighest idea that Gauss had ever meditated anything different from the rest of the world on the matter of the parallel axiom I showed in *Science*, Vol. IX, No. 232, pp. 813-817.

Of two utterly worthless theories of parallels Gauss gave extended notices in the Göttingische gelehrte Anzeigen.

To Lobachevski's Theory of Parallels, to John Bolyai's marvelous Science Absolute of Space, Gauss vouchsafed never one printed word.

As Staeckel gently remarks, this certainly contributed thereto, that the worth of this mathematical gem was first recognized when János had long since finished his earthly career.

A PROOF THAT FOUR LINES IN SPACE ARE IN GENERAL MET BY TWO OTHER LINES.

By DR. T. M. PUTNAM, University of California.

Using the ordinary method of descriptive geometry a point in space is represented by *two* points in a plane, viz., by its horizontal and vertical projections, the vertical plane being thought of as rotated into coincidence with the horizon-

tal plane. Similarly a line in space will be represented in general by *two* lines in the plane. If two lines intersect in space their projections meet in points lying on a line perpendicular to the ground line. Let

$$y=m_ix+c_i \text{ and } y=h_ix+k_i \quad (i=1, 2, 3, 4)$$

be the projections of four arbitrary lines in space, the ground line being taken as the X-axis. Cut them respectively by the lines $y=Mx+C$ and $y=Hx+K$. If the abscissas of the corresponding points of intersection are equal, the space line whose projections are $y=Mx+C$ and $y=Hx+K$ will cut the four given lines. These conditions are

$$\frac{c_i-C}{M-m_i}=\frac{k_i-K}{H-h_i} \quad (i=1, 2, 3, 4)$$

or $Mk-HC-m_iK+h_iC+c_iH-k_iM-h_ic_i+m_ik=0$.

These four equations have in general *two* independent sets of solutions for for M, K, C, H, showing, therefore, that two lines meet the four space lines.

DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

99. **Proposed by C. H. JUDSON,* Professor of Mathematics, Furman University, Greenville, S. C.**

Seven persons met at a summer resort and agreed to remain as many days as there are ways of sitting at a round table, so that no one shall sit twice between the same two companions. They remained fifteen days. It is required to show in what way they may have been seated.

Solution by F. H. SAFFORD, Ph. D., The University of Pennsylvania.

ABCDEFG,	AGDBCEF,	ABDEGFC,
ADFEBGC,	ADBFCEG,	ADEBCGF,
AEGBDCF,	AEDGFBC,	ADCGEFB,
ACEDFBG,	ABECGEF,	AEFCBGD,
AFBEGDC,	AEBDFCG,	ABGFDCE.

I believe that all solutions for seven persons may be obtained from that above by permutations of letters.

*March, 1899; March 1900. The general problem is treated by group theory by L. E. Dickson in an article offered February, 1904, to the *Annals of Mathematics*. A third solution for six persons is there given.